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ABSTRACT

This study by the Rand Corporation is part of a series analyzing the educational personnel system. This report focuses on the principal educational manpower policy problem--the teacher surplus. Specifically, a number of alternative projections are developed for the market for teachers, showing policy issues that will arise if the current imbalances in the market continue are discussed, and information that educational personnel policy-makers will need in order to deal with these issues are specified. (Author)

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ANALYSIS OF THE EDUCATIONAL PERSONNEL SYSTEM: VIII. THE MARKET FOR TEACHERS

PREPARED FOR THE DEPARTMENT OF HEALTH, EDUCATION, AND WELFARE

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PREFACE

The Rand Corporation, supported by the U.S. Office of Education, has conducted an analysis of the educational personnel system in the United States. The objective of the analysis was to examine empirically, subject to the limitations of the available data, the flows of elementary and secondary teachers into, through, and out of the system. The educational personnel system--comprising millions of personnel, thousands of educational institutions, and numerous government agencies--is too complex to be perceived in full detail and in its entirety. We have not attempted to develop one, all-encompassing description in fine detail, but rather a series of sketches, done from a variety of points of view and emphasizing important aspects of the system. This is the eighth, and last, report in a series presenting the results of Rand's analyses.

In this report we abstract from the details of the educational personnel system to focus on the principal outstanding educational manpower policy problem--the teacher surplus. Specifically, we develop a number of alternative projections of the market for teachers, showing what might be the future course of the surplus in various circumstances. We then elucidate the major policy issues that arise if current imbalances continue in the labor market for teachers. And, finally, we discuss the data that educational personnel policymakers will require if they are to deal with those issues.

The other reports in this series are:

- David Greenberg and John McCall, *Analysis of the Educational Personnel System: I. Teacher Mobility in San Diego*, R-1071-HEW, January 1973.
- David Greenberg and John McCall, *Analysis of the Educational Personnel System: II. A Theory of Labor Mobility with Application to the Teacher Market*, R-1270-HEW, August 1973.
- Stephen J. Carroll, *Analysis of the Educational Personnel System: III. The Demand for Educational Professionals*, R-1308-HEW, October 1973.

- Emmett Keeler, *Analysis of the Educational Personnel System: IV. Teacher Turnover*, R-1325-HEW, October 1973.

- Stephen J. Carroll and Kenneth F. Ryder, Jr., *Analysis of the Educational Personnel System: V. The Supply of Elementary and Secondary Teachers*, R-1341-HEW, February 1974.

- Kenneth F. Ryder, Jr. and Bruce M. Juba, *Analysis of the Educational Personnel System: VI: Staffing Patterns in U.S. Local Public Schools*, R-1342-HEW, February 1974.

- David Greenberg and John McCall, *Analysis of the Educational Personnel System: VII. Teacher Mobility in Michigan*, R-1343-HEW, February 1974.

SUMMARY

Previous studies of the market for elementary and secondary teachers have projected a large and growing teacher surplus throughout the foreseeable future. The prospect of a continuing surplus of teachers has become a major educational personnel policy issue. This study attempts to contribute to the development of an appropriate response to the situation through a detailed examination of the likely future behavior of the market. Our major findings are outlined as follows:

DEMAND FOR TEACHERS

- Available projections of the total demand for teachers estimate that roughly 2.3 million teachers will be employed in elementary and secondary classrooms each year throughout the 1970s.
- These projections are as reliable as can reasonably be expected. However, there is considerable potential for unpredictable departures from existing trends in the teacher/pupil ratio, which would cause corresponding changes in the projected demands.
- The available projections also suggest that the annual net demand for classroom teachers will be roughly constant (about 200,000) through the early 1980s.
- The annual teacher termination rate appears to be overestimated. But the resulting overprojection of annual net demands is offset by the failure to take account of classroom positions vacated by teachers moving to nonteaching (administrative or supervisory) positions in education.

SUPPLY OF TEACHERS

- Although there is considerable variance among the available projections of teacher supply, several projections have forecasted persistent growth through 1980. Their estimates of the

total supply of teachers in 1980 range from 3.3 million to 3.9 million; they project net supplies of teachers in that year ranging from 273,000 to 391,000.

- These projections assume a constant teacher production rate (the proportion of new college graduates qualified to teach) of 35 percent. However, the teacher production rate has consistently declined over the past seven years, and there is sufficient evidence that the decline in the rate will continue, perhaps even accelerate, for some years to come.
- It thus appears that these projections have grossly overestimated the likely future supplies of new teachers. The potential magnitude of the overprojection is suggested by the following display, which shows estimates of the supply of new teachers (in thousands) in 1975 and 1981, assuming that the teacher production rate will: (1) be constant at 35 percent, (2) follow the 1966-1972 trend, and (3) decline at an average annual rate equal to the annual average rate of decline in the proportion of college freshmen intending to pursue a teaching career. Projections 1 and 2 are, we feel, overestimates of likely future teacher production, while Projection 3 is likely to be an underestimate.

Projection	1975	1981
1	239	308
2	199	225
3	126	61

- These projections also appear to have overestimated annual supplies from the reserve pool, since an overprojection of the number of new teachers produced in any year leads to an overprojection of the size of the reserve pool in subsequent years. The potential magnitude of the overprojection is suggested by the following display, which shows high and low estimates of the supply of reserve teachers (in

thousands) in 1975 and 1981, assuming that the teacher production rate will: (1) be constant at 35 percent and (2) decline at an annual average rate equal to the annual average rate of decline in the proportion of college freshmen intending to pursue a teaching career.

Projection	1975	1981
1	435	764
2	358	418

TEACHER SURPLUS

- The projections reviewed here are unanimous in forecasting a growing surplus of teachers through 1980. However, if the anticipated declines in the teacher production rate materialize, the teacher surplus is likely to peak and then begin to decline in the next few years.
- The following display shows the high and low estimates of the magnitude of the surplus (in thousands) in 1975 and 1981, assuming that the teacher production rate will: (1) be constant at 35 percent and (2) decline at an annual average rate equal to the annual average rate of decline in the proportion of college freshmen intending to pursue a teaching career.

Projection	1975	1981
1	437	796
2	204	153

- There is a possibility that the surplus will end sometime in the early 1980s. Moreover, the dynamics of the market are such that the end of the surplus, whenever that may be, will be almost immediately followed by a shortage of teachers.

IMBALANCES IN THE MARKET

- There is good reason to suspect that an aggregate imbalance in the market for teachers (shortage or surplus), despite its undesirable aspects, might be preferred to balance.
- Imbalances arise form the presence of barriers to market adjustment; educational manpower policy should focus on minimizing the social costs that arise because of these barriers.
- Before policy is formulated, concerned policymakers should address a basic issue: How are the benefits and costs that accrue to teachers as a result of the market situation to be weighed vis à vis the benefits and costs that accrue to students, the community, and the society as a whole?

EDUCATIONAL MANPOWER DATA NEEDS

- Limitations of the available data, particularly regarding the supply of teachers, are so severe that any projections of the market, including those presented in this report, involve an inordinate amount of guesswork.
- The available data are not sufficient to establish the likely trend in the teacher production rate. There is no reliable evidence regarding the size of the reserve pool, its composition, or the proportion of reserve teachers that are likely to attempt to enter teaching positions.
- In addition to gaps in the aggregate data, the available educational manpower data tend to be too highly aggregative and retrospective. Efforts should be directed toward developing a data system capable of routinely providing projections of the supply of and demand for teachers, by skill specialization, at the local level.

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I. INTRODUCTION

PURPOSE

The Rand Corporation, with support from the U.S. Office of Education, has analyzed several aspects of the educational personnel system in the United States. In this report we bring together the results of those analyses that bear on the principal outstanding educational manpower policy problem--the teacher surplus. Our purpose is to contribute to the development of an appropriate response to the situation through a detailed examination of the current and likely future behavior of the market for teachers.

THE POLICY PROBLEM

The labor market for elementary and secondary teachers is one of many professional labor markets distinguished from other occupational labor markets by the high-level skills (college training) required for entry. It is the largest professional labor market, accounting for more than 22 percent of the employment of professional and technical workers in 1971; it is also one of the most widely dispersed.

The behavior of this large and important market has recently become a major public policy issue. A teacher surplus emerged in the late 1960s and has grown steadily since then. Several studies of the supplies of and demands for teachers have predicted that the surplus will continue to grow throughout the 1970s and into the 1980s. According to these studies, the number of excess teachers in 1980 may exceed 1.5 million. Policymakers concerned with educational personnel are thus confronted with a situation that appears to be growong more serious every year. The question of what can or should be done to reduce the surplus is now the dominant education manpower problem.

PRINCIPAL RESULTS OF OUR ANALYSIS

Our analysis of the teacher surplus suggests that *the previous projections may have grossly overestimated the likely future magnitude of the teacher surplus.* We suspect that the surplus will peak in the next

few years, and then begin to decline. While our projections support the notion that the surplus will continue throughout the 1970s, we do not foresee a problem of the magnitude suggested by some earlier studies.

Our analysis also suggests that the likely duration of the surplus has been overestimated. In our view, the dynamics of the teacher labor market are changing, to the point that *there is a distinct possibility that a shortage of teachers will emerge in the early to mid-1980s.*

This finding is particularly important since there appears to be a substantial "lag structure" in the market for teachers. The current status of the market is largely determined by decisions made some years in the past, and current decisions are likely to have an impact on the market some years in the future. This raises the possibility that *current policies designed to reduce the size of the surplus may prove to be counterproductive* by reducing teacher supplies or expanding demands for teachers at a time when a teacher shortage is developing.

UNRESOLVED ISSUE

There appears to be widespread acceptance of the notion that an aggregate imbalance in the market for teachers, either a shortage or a surplus, is undesirable. If this view is correct, future educational manpower policies should attempt to override the normal functioning of the market to eliminate, if possible, or reduce inequalities between supplies of and demands for teachers.

There are a number of different groups affected by these imbalances. Shortages are advantageous to some groups and disadvantageous to others; surpluses reverse these effects, albeit not to the same extent. Research can contribute to an understanding of the relationship between a teacher shortage or surplus and the resulting distribution of costs and benefits among various segments of society. But the determination of the socially most preferred distribution is ultimately a value judgment.

The primary implication of these remarks is that balance in the market for teachers is not necessarily desirable. In fact, *a continuing teacher surplus or shortage may be the appropriate objective of educational personnel policy.* However, the question of what is the desired

distribution of costs and benefits has not, as yet, received sufficient attention. And so the issue of what should be the objective of educational manpower policy remains unresolved. This, we submit, is a major educational manpower issue. It should be addressed before the issue of what should be done about the current teacher surplus is fully resolved.

THE PLAN OF THIS REPORT

In Section II we examine the likely future behavior of the market for teachers. The costs and benefits resulting from alternative states of the market are explored in Section III. Section IV contains a brief discussion of the limitations of currently available data regarding educational personnel.

II. THE TEACHER SURPLUS

Several projections of the supplies of and demands for teachers have forecasted large and growing excess supplies of teachers into the 1980s. These projections underlie and affect most current educational personnel policy decisions. Our analysis, however, casts doubts on the accuracy and reliability of the previous projections and suggests that the dynamics that produced the surplus are changing. In fact, it appears that we might reenter a period of shortage in a decade or so.

PREVIOUS PROJECTIONS OF THE TEACHER SURPLUS

Several public and private organizations have attempted to project the state of the market for teachers through the 1970s. Table 1 shows projections reported by the National Education Association (NEA) (1972), the U.S. Department of Labor (DOL) (1972), the National Center for Educational Statistics (NCES) of the U.S. Office of Education (1971), Joseph Froomkin et al. (1971), Edward Rattner et al. (1971), and the Commission on Human Resources and Advanced Education (Folger, Astin, and Bayer, 1970).* The NEA, Froomkin, and Rattner studies attempt to predict the total magnitude of the surplus. Their results suggest that by 1980 there will be at least 600,000 excess teachers, and perhaps as many as 1.5 million. The NCES, the DOL, and the Commission essentially project the annual growth in the size of the surplus. Hence their results suggest that the surplus in 1980 will grow by 73,000 to 191,000.

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*Neither the DOL nor the Commission explicitly provide projections of the teacher surplus. Both project the demand for teachers through 1980 and compare their respective projections with trends in the supply of teachers. We have imputed the surplus projections implicit in their discussion. See Carroll and Ryder (1974) for a detailed review of these studies. More recent projections by the NCES and the NEA were not available in time to be included in this review.

Table 1

ESTIMATED TEACHER SURPLUS: 1972, 1975, 1980
(thousands)

Study	1972	1975	1980
NEA	118	---	---
DOL[a]	10	54[b]	73
NCES	135	185	191
Froomkin	-198[c]	414	619
Rattner	0[c]	---	1,510/930[d]
Commission[a]	31	62	122

[a]Surplus estimated by imputing supply projection and subtracting projected demands.

[b]Estimate for 1976.

[c]Estimate for 1970

[d]High/low estimates.

The teacher surplus is defined as the number of qualified teachers seeking teaching positions minus the number of teaching positions available.* The accuracy of a projection of the teacher surplus thus depends upon the accuracy of the underlying projections of the demands for and the supplies of teachers. While the demand projections underlying the previous studies of the market for teachers appear to be reliable, there are several important questions regarding their respective supply projections. We discuss these projections in the remainder of this section.

THE DEMAND FOR TEACHERS

Table 2 presents the projections of the demand for teachers provided by previous studies. All six studies essentially define the demand for teachers as the required number of teachers, given enrollments, to maintain existing trends in the teacher/pupil ratio. The Froomkin study

*A negative result would indicate a shortage of teachers.

projects the total number of teachers required in the education sector, including qualified teachers employed in nonteaching (administrative, supervisory, and specialist) positions. The other five studies project the number of teachers required in classrooms.

Table 2

ESTIMATED DEMAND FOR TEACHERS: 1972, 1975, 1980
(thousands)

Study	Total Demand			Demand for New Hires		
	1972	1975	1980	1972	1975	1980
NEA	2,112	---	---	197	---	---
DOL	2,326	2,311[a]	2,349	180	177[a]	200
NCES	2,295	2,305	2,316	180	162	200
Froomkin	2,531[b]	2,611	2,927	---	---	---
Rattner	2,269[b]	2,304	2,354	---	---	---
Commission	---	---	---	207	211	180

[a]Estimate for 1976.

[b]Estimate for 1970.

Projecting the Demand for Teachers

The previous studies have all used a similar technique to project the total demand for teachers. The current trend in the teacher/pupil ratio is extrapolated to the year of interest and multiplied by the number of pupils expected to be enrolled in that year. The expected enrollment level is, in turn, projected as the product of the expected size of the school-age population and an extrapolation of the current trend in the enrollment rate. U.S. Census Bureau projections of the age distribution of the population provide the estimates of the future size of the school-age population.

More elaborate projections attempt to take account of differential enrollment rates by age or grade levels and differential trends in teacher/pupil ratios between elementary and secondary schools and between private and public schools. For example, the demand for public school teachers for age i pupils is projected as the product of the census projection of the age i population, the projected enrollment rate of

age i children, the projected proportion of age i enrolled pupils who will attend public schools, and the projected teacher/pupil ratio in public elementary (if $i \leq 13$) or secondary (if $i > 13$) schools. All projections are extrapolations of current trends. By a similar set of calculations, one can project demands for teachers at each grade level in both public and private schools and sum to obtain the projected total demand for teachers.

Net demand in a given year is projected as the difference between total demand in the year and total demand the previous year plus the product of the previous year's total demand and the expected teacher termination rate. The procedure assumes that during a teacher surplus all available positions will be filled, hence total demand equals the number of teachers employed. The difference in total demand from one year to the next is the number of additional teachers that must be employed to maintain the trend in the teacher/pupil ratio, given changes in enrollments and in the teacher/pupil ratio. The product of the previous year's total demand and the termination rate is the number of additional teachers required for replacement.

Thus, net demand in year t can be written as total demand in year t minus the number of teachers employed the previous year who remain in education (i.e., do not terminate.) If "net" supply in year t is defined as the number of qualified teachers not employed in teaching positions in year t - 1 who seek to enter such positions in year t, we can subtract net demand from net supply to estimate the number of persons seeking to enter teaching positions in excess of the number of positions vacant (i.e., the teacher surplus.) Alternatively, we can define the supply of teachers in year t as the total number of persons seeking teaching positions in that year--net supply plus teachers from the previous year who remain in education--and subtract total demand to estimate the number of qualified persons seeking teaching positions (whether or not they already hold one) in excess of the total number of positions. Since the difference between total and net supply, the number of continuing teachers, identically equals the difference between total and net demand, the two approaches are equivalent and yield identical estimates of the size of the surplus.

Enrollment Levels

Barring major changes in the conception of elementary and secondary education (e.g., extending near-universal education downward to preschool levels, eliminating the last year or two of secondary education) enrollment levels can be projected over the forthcoming decade with considerable accuracy. Demographic data regarding the size of the school-age population (birth and mortality rates and the size of the female population in childbearing age groups) are readily available, and the effects of unforeseen changes in these factors are felt only after a substantial delay. For example, the most recently available NCES enrollment projections are based on 1971 data.* They show that a substantial (13-percent) increase in the then current birth rate would only increase enrollments in 1981, ten years later, by about 2.3 percent, while a 13-percent decrease in the birth rate would result in a 2.4 persent decrease in enrollments ten years later.

Given the size of the school-age population, enrollment at each grade level depend upon age-specific enrollment rates. At present, except for the five-year-old group, the prevailing enrollment rates are very high.** Even if the enrollment rate among five-year-olds were to increase substantially (for example, an increase to a 90-percent enrollment rate), the net effect on enrollments in 1980 would be small (about 1 percent). And there does not appear to be any reason to expect substantial decline in the prevailing enrollment rates.

The distribution of enrolled children between public and private education at a specific grade level is much less susceptible to accurate projection. Nearly 80 percent of the students who do not attend public schools are enrolled in Catholic schools, and the question of what the future status of that sector will be raises a variety of issues. However, the proportion of students in private education is small (about 10 percent) and the difference between public and private teacher/pupil ratios is

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*See NCES (1973, pp. 163-180).

**See NCES (1973, pp. 119-162).

not large.* Thus a substantial shift of students from the private sector to the public sector would have a negligible impact on the overall demand for teachers.

Teacher/Pupil Ratios

The assumed teacher/pupil ratio is a crucial parameter in projections of the demand for teachers. Given a projection of total enrollments, a change in the projected teacher/pupil ratio will yield a change of equal percentage in the projected demand for teachers. Thus, if the projected value of the teacher/pupil ratio in year t were 5 percent too low, the projected total demand for teachers would also be 5 percent too low.

Previous studies have projected the teacher/pupil ratios by extrapolating past trends. The accuracy of these projections thus depends upon the extent to which these trends will be continued into the future. A school district's teacher/pupil ratio is determined in the course of a complex budget allocation process: School district budgets are based upon the community's perceptions of its educational needs, its ability and willingness to allocate funds to meet those needs, and the amount of state and federal aid received. The LEA, in turn, allocates its budget among various school inputs--teachers, aides, supplies, and so on. The LEA's teacher/pupil ratio thus depends upon the size of its budget, the costs of purchasing or hiring the various school inputs (e.g., teacher salaries), its commitments (contracts with teachers, tenure policies, agreements with suppliers of purchased inputs, and the like), and the ways in which it organizes instructional activities.** Carroll (1973), for example, estimates that a 10-percent increase in a school district's budget, other things being equal, will lead to increases in its teacher/pupil ratio of about 5 percent at the elementary level and 6 percent at the secondary level.

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*NCES (1973) reports pupil/teacher ratios in public (private) elementary and secondary schools in 1971 of 24.3 (27.6) and 19.9 (18.3), respectively.

**"Open schools," "schools without walls," and similar departures from the traditional self-contained classroom can generate staffing patterns substantially different from the norm.

In short, past trends in teacher/pupil ratios will be continued only if aggregate educational expenditures, teacher salaries, and so on change over time, in precisely the ways required to yield the implied expenditure and staffing patterns. In light of the prospects for reform of school finance at both the state and national levels, the emergence of militant teachers' unions, the pace of inflation, and so on, significant deviations from the implied patterns would not be surprising. However, we have only limited understanding of how these factors change over time and how changes in them affect staffing and expenditure policies.

Thus, the available projections of the teacher/pupil ratio will probably prove to be reasonably accurate as long as there is no major "shock" to the system. But there appear to be many likely opportunities for major changes in factors that strongly affect the ratio, and we cannot predict which, if any, will occur or when.

Teacher Terminations

The four studies focusing on the annual net demands for teachers (NEA, DOL, NCES, and the Commission) use an additional parameter--teacher termination rate. In each case it is assumed that a constant proportion (8 percent) of the stock of teachers will leave their positions each year.* This assumption does not appear to be warranted. First, many teacher terminations result from decisions to leave teaching for a short period rather than permanently. Women who temporarily "retire" in mid-career to devote more time to their families are a prime example. In conditions of general surplus, reentry is undoubtedly more difficult than it was when teacher shortages prevailed, and informal "leaves of absence" are likely to decline in view of the changed nature of the market for teachers. The second reason for expecting reduced rates of termination in the future is related to the demographic characteristics of the teaching force. The rapid growth in enrollments that occurred in the 1950s and early 1960s generated equally rapid growth in the teaching force. Large numbers of

*The NCES assumes a teacher termination rate of 8 percent for public schools and 4 percent for private schools.

beginning teachers entered the profession each year and the average age of the force declined. Retirement rates are thus likely to decline.*

The net demand for teachers is fairly sensitive to the termination rate. In 1975, for example, the studies reviewed here project a total demand for roughly 2.3 million teachers (see Table 2). A change of one percentage point in the teacher termination rate, say from 8 percent to 7 percent, would reduce the net demand for teachers by about 23,000. This represents a reduction of 10 to 15 percent in the net demand for teachers.

With the exception of Froomkin, previous studies have focused on projecting the numbers of classroom teachers that will be required for projected enrollments. In adopting this approach, they obviously undercount the number of teachers that will be employed in the education sector, inasmuch as administration, specialist, and other nonteaching positions are held by qualified teachers. Froomkin (1971) estimates that in 1970 approximately 200,000 persons qualified to teach held nonteaching positions in schools, and Greenberg and McCall (1973a, 1973b, 1974) have shown that vacant administrative and other supervisory positions tend to be filled by promotion of classroom teachers. Thus, it appears that terminations among professionals in nonteaching positions contribute to the net demand for classroom teachers.

THE SUPPLY OF TEACHERS

Table 3 displays previous projections of the supply of teachers. There is little agreement among the studies as to what is meant by the concept of teacher supply. In addition, there are many serious gaps in the available data concerning the supply of educational professionals; most of the key parameters that underlie each of the supply projections are not known and have to be estimated. The previous studies used different approaches to deal with this problem.

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*Keeler (1973) has reviewed the available studies of teacher termination and shows that termination rates have fluctuated between 7 and 10 percent in the 1960s with no apparent trend. However, he argues that overall rates of termination are likely to fall in the 1970s, perhaps by 2 to 3 percentage points.

Table 3

ESTIMATED SUPPLY OF TEACHERS: 1972, 1975, 1980
(thousands)

Study	Total Supply			Net Supply		
	1972	1975	1980	1972	1975	1980
NEA	2,230	---	---	315	---	---
DOL[a]	---	---	---	190	231[b]	273
NCES	---	---	---	315	347	391
Froomkin	2,333[c]	3,025	3,546	---	---	---
Rattner	2,269[c]	---	3,864/3,284[d]	---	---	---
Commission[a]	---	---	---	238	273	302

[a]Imputed.

[b]Estimate for 1976.

[c]Estimate for 1970

[d]High/low estimates.

The NCES defines the net supply of teachers as the number of new college graduates qualified to teach; the DOL, as the number of new graduates qualified to teach who attempt to enter teaching positions; and the Commission, as the number of new college graduates whose degrees are in education. All three studies comment on the "reserve supply"; that is, persons qualified to teach at some previous time who now seek positions in education. However, none of the three incorporates estimates of the size of the reserve supply in their projections of the supply of teachers.

The NEA, Froomkin, and Rattner studies define the net supply of teachers as the number of new graduates qualified to teach who seek teaching positions plus the number of reserve teachers who seek positions. The three studies use essentially the same definition of the supply of new graduates, but their definitions of the reserve supply are quite different.

All six studies define the continuing supply as the number of teachers employed in teaching positions who do not terminate. Froomkin and Rattner add the continuing supply to the net supply and compare the result, the total supply, to total demand. The other four studies subtract the con-

tinuing supply from the total demand and compare the result, the net demand, to net supply. As we noted earlier, the two approaches are equivalent.

Projecting the Supply of Teachers

The total supply of teachers includes individuals drawn from three basic manpower pools--new graduates qualified to teach, persons qualified to teach at some previous time but not currently employed in teaching positions (the reserve pool), and qualified teachers currently employed in teaching positions. Each pool contains individuals that, for various reasons, voluntarily choose not to pursue a teaching position. The supply of teachers that derives from each of these pools thus consists of persons in the pool who seek teaching positions.

The distinction between a supporting manpower pool and the supply of professionals that derives from it is crucial since persons who choose not to enter teaching positions, even though they are qualified to teach, are not relevant to an assessment of the state of the market for teachers. Teacher shortages are not alleviated by the presence of qualified professionals unwilling to enter vacant teaching positions. And qualified teachers who do not seek positions are not "in excess" during a teacher surplus.

An equally important distinction is the difference between the number of persons seeking positions and the number hired. During a generalized teacher shortage, it can be assumed that nearly all qualified professionals who seek positions will be hired. But during a surplus, some of those who seek positions will be unsuccessful.

The Supply of Eligible New Graduates

The supply of eligible new graduates in any year is defined as the number of new college graduates qualified to teach who seek teaching positions in that year. Three elements thus enter the projection of this component of teacher supply: (1) the size of the bachelor's degree class, (2) the proportion of new graduates prepared to teach, and (3) the proportion of eligible new graduates seeking positions in the education sector. It appears that the available projections of the annual sizes of future BA

classes are overestimates.* However, an analysis of the determinants of college entrance and completion was beyond the scope of our study; therefore we have relied upon the available projections. The NEA reports the proportion of newly qualified teachers who entered teaching positions each year since 1952. During the period 1952-1968 there were teacher shortages. Assuming that virtually all qualified professionals who sought positions were successful, we can interpret the NEA rates as estimates of the rates at which eligible new graduates have, in the past, sought teaching positions. The annual average rate at which new graduates qualified to teach at the elementary level sought teaching positions was 81 percent during the years 1952 through 1968; the rate for the secondary level for the same period was 65.1 percent.

Currently available projections of new teacher supply assume a teacher production rate--the proportion of new graduates qualified to teach--of approximately 35 percent. This assumption is based upon the annual NEA reports of teacher education graduates, at both the bachelor's and master's degree levels, as a percentage of the bachelor's and first professional degree class, reproduced in the second column of Table 4.** These data suggest that the teacher production rate has been quite stable over the last decade, ranging from a high of 36.3 percent in 1966 to a low of 33.6 percent in 1967. However, the NEA method of calculating the annual teacher production rate is quite misleading. The number of first professional degree recipients is not relevant to the market for teachers; and the number of master's degree recipients is not reflected in the calculation. Thus underlying trends in the rates at which college graduates have prepared to teach are obscured. Moreover, there is some question regarding the accuracy of the data on the numbers of initially qualified graduates at the master's degree level. Many institutions do not have data on the number of their master's degree recipients who were previously qualified to teach and report the total number of graduates qualified to teach at the master's degree level.

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*Watkins (1973) points out that the available projections of college enrollments appear to overestimate total enrollments by 10 to 15 percent.

**The NEA uses the term "teacher education graduates" to describe college graduates qualified to teach.

Table 4

AGGREGATE TEACHER PRODUCTION RATES:
QUALIFIED GRADUATES, 1966-1972

Year	Percent of Total BA and First Professional Degree Class (NEA)	Percent of BA Class Prepared to Teach	Index of Change (1966 Base)[a]
1966	36.3	34.4	100.0
1967	32.6	33.1	96.3
1968	35.2	32.5	93.6
1969	34.8	32.3	92.8
1970	34.6	31.9	92.1
1971	36.0	31.4	90.5
1972	36.1	30.5	88.2

[a]This index represents the ratio of the number of new graduates qualified to teach in each year to the number of new graduates who would have been qualified to teach in that year if they had prepared to teach at the same rates as graduates in the class of 1966.

In the light of these observations we constructed an alternative set of teacher production rates for the period 1966-1972. These rates, shown in the third column of Table 4, reflect the annual percentage of the bachelor's degree class who were prepared to teach. They show a distinct downward trend. There is not one instance over the seven-year period in which the rate fails to fall from one year to the next; the cumulative impact is a drop in the teacher production rate of approximately 12 percent between 1966 and 1972.

Thus far we have examined the actual rates of teacher production over the past seven years. A data base developed by the American Council on Education (ACE) offers some insight into what is likely to happen to teacher production rates in the near future. In an annual survey of entering college freshmen, the ACE obtains data on their career plans and intentions. Table 5 summarizes some of the results of those surveys. The trends in the data are obvious. Since 1968 the rate at which entering college freshmen have indicated that they intend to pursue a teaching career has rapidly declined. By 1972 the proportion of entering college freshmen who expected to enter the teaching profession had fallen to

about one-half of the proportion of entering college freshmen in 1968 who aspired to careers in elementary and secondary education.

Table 5

ACE ESTIMATED PERCENTAGES OF ENTERING FRESHMEN INTENDING TO PURSUE A TEACHING CAREER: 1966-1972

Year	Entering Freshmen		
	Male	Female	Total
1966	11.3	24.1	21.7
1967	11.2	36.4	22.4
1968	12.7	37.5	23.5
1969	10.9	36.5	22.1
1970	9.6	31.0	19.3
1971	7.5	24.8	15.4
1972	5.7	19.5	12.1

It is clear that if the career choices of entering college freshmen are indicative of their subsequent behavior, the ACE results have serious implications for future supplies of new teachers. In order to investigate this issue we developed a general econometric model of career choice using data from a variety of sources.* We then used the model to examine the relationships between the number of individuals who prepare for a teaching career and economic conditions in the market for teachers. The model provided two important results: First, the choices of college students as to whether or not they will prepare for a teaching career are related to the availability of jobs in the education sector. Second, there is a lag of three to four years in the teacher production rate. That is, the teacher production rate in any given year is related to economic conditions in the market for teachers three to four years earlier.

In view of the results of our reexamination of the NEA data, the ACE data, and our analysis of career choice, *it is clear that the annual teacher production rate, which has consistently declined over the past seven years, is likely to continue to decline.* To explore the possible implications of

*See Carroll and Ryder (1974).

continued decline in the proportion of new college graduates qualified to teach, we projected teacher production rates through 1981 under a variety of alternative assumptions. These rates were then multiplied by the NCES (1973) projections of annual numbers of new college graduates to illustrate the impact of alternative assumptions regarding the teacher production rate in terms of the annual supplies of new teachers. Table 6 summarizes the results of this effort.

Table 6

ALTERNATIVE PROJECTIONS OF THE SUPPLY OF NEW TEACHERS, 1973-1981

Year	Projection			
	1	2	3	4
1973	233.4	201.0	171.4	159.0
1975	238.9	199.2	126.3	100.4
1977	265.8	212.6	100.8	69.0
1979	292.0	223.6	79.8	47.2
1981	307.7	224.7	60.7	31.2

All four sets of projections assume the NCES projections of annual BA classes and the earlier mentioned estimates of the rates at which new graduates qualified to teach will seek positions. Thus,

- Projection 1 assumes that the teacher production rate will be .35 throughout the projection period.
- Projection 2 assumes that the downward trends in teacher production rates are continued through 1981. We estimated the linear trend in the annual teacher production rates, by sex, over the 1966-1972 period and extrapolated to future years to obtain projections of future production rates.*

*The regression results are given in Carroll and Ryder (1974).

- Project 3 takes account of the recent sharp declines in the rates at which entering college freshmen intend to pursue a career in teaching. For each of four groups (males and females interested in teaching at the elementary or secondary level) we computed the average annual rate of decline in interest in a teaching career, as reported by the ACE between 1968 and 1972. We then assumed that each sex-level specific teacher production rate would annually decline from its 1972 level at that average annual rate.*
- Projection 4 is computed in essentially the same manner as Projection 3. However, in this case, we use the annual average rates of decline in entering fresnmen interested in teaching in the 1970-1972 period. These projections thus reflect the recent acceleration in the decline of freshmen intentions to pursue a teaching career.

The variance among the four sets of projections in Table 6 is attributable to the impact of the alternative assumptions regarding the future values of the teacher production rate. In view of the earlier analysis of trends in the teacher production rate, Projection 1, which assumes constant teacher production rates, appears to grossly overestimate the likely future supplies of new teachers. Since Projection 1 is conceptually equivalent to the projections of new teacher supply used in the previous studies, *we conclude that those studies have grossly overprojected the likely future supplies of new teachers. Consequently, their projections of the total supplies of teachers and of the sizes of the teacher surplus are overestimated.*

Projection 2 reflects the downward trends in teacher production rates that obtained over the 1966-1972 period. In the absence of evidence to

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*This is equivalent to assuming constant rates at which students change between teacher preparation and alternative curricula and constant rates at which students drop out of college.

the contrary it would be reasonable simply to extrapolate these trends into the future. However, the ACE data and our results regarding the relationship between the relative availability of teaching positions in a particular year and the teacher production rate three or four years later suggest that the declines in the teacher production rates are likely to accelerate, at least for a few years. From this perspective, even this set of projections appears to overestimate the likely future supplies of eligible new graduates.

Projections 3 and 4 take into account the sharp declines in interest in a teaching career among entering college freshmen. Since we have little evidence concerning the relationship between the career choices expressed by entering college freshmen and their subsequent behavior, these projections are highly speculative. However, the notions that freshmen disinterested in a teaching career are not likely to enter a teacher preparatory program and that the rate of transfer into teacher preparatory programs is not likely to increase in a surplus situation suggest that the career choices of entering college freshmen are meaningful indicators of likely future trends in teacher production rates. In sum, taking account of our results in estimating the career choice model and the ACE data, these sets of projections are not totally unreasonable.

These results suggest that the rate of decline in the annual teacher production rates is likely to be significantly larger than the rate of growth in the annual numbers of new college graduates. Thus, there is good reason to expect that the annual supplies of new teachers will decline sharply throughout the 1970s.

The Supply of Reserve Teachers

The supply of reserve teachers in any year is defined as the number of persons qualified to teach, but not employed in teaching positions, the previous year who seek teaching positions in that year. Consequently, the elements that enter a projection of the reserve supply are the current size of the reserve pool, annual rates of entry into and exit from the pool, and the proportion of those in the pool seeking teaching positions. The results outlined above suggest that *previous studies have overestimated the annual supplies from the reserve pool since an overprojection of the*

number of new teachers produced in any year results in an overprojection of the size of the reserve pool in subsequent years.

The available data regarding the rate at which reserve teachers seek teaching positions are so poor that we cannot estimate the significance of these overprojections. To obtain an indicator of how serious might be the implications of these overprojections, we have projected the supply of reserve teachers through 1981 using a number of different sets of assumptions. The results are presented in Table 7.

Table 7

ALTERNATIVE PROJECTIONS OF THE SUPPLY OF RESERVE TEACHERS, 1973-1981
(thousands)

Year	Projection 1	2	3	4
1973	330.4	293.4	293.4	218.4
1975	434.5	380.2	358.5	276.7
1977	545.9	470.4	405.6	319.0
1979	658.7	554.8	427.7	338.8
1981	763.5	622.8	418.5	329.8

The rate at which reserve teachers seek teaching positions is virtually unknown. The NEA reports that in 1960, 18.3 percent of the reserve teachers sought to enter the education sector. Rattner notes that in 1970, presumably a year of approximate balance in the market for teachers, the ratio of the total size of the reserve pool to the total demand for teachers was .62. He assumes that this is an "equilibrium" relationship in the sense that the number of reserve teachers who do not seek to enter the education sector will, in general, equal 62 percent of the total number of teachers employed in teaching positions. Thus he assumes that the number of reserve teachers who seek positions in any year equals the number of teachers in the reserve pool in excess of .62 times the demand for teachers in that year. However, this approach implies rather peculiar behavior by reserve teachers. An increase in the number of teachers demanded, in this approach, increases the number of reserve teachers not interested in a teaching position, and thus leads to a decrease in the number of reserve teachers who

seek teaching positions. Hence an increase in the relative availability of teaching positions is implicitly assumed to reduce the relative attractiveness of a teaching career for reserve teachers, clearly an unacceptable hypothesis.

For lack of any better alternative, we used the NEA estimate to develop the projections given in Table 7.

We adopt Rattner's definition of the size of the reserve pool. That is, the size of the pool at the beginning of any given year is assumed to equal the sum of the numbers of new teachers produced during the previous 30 years minus the number of teachers employed in the education sector the previous year.* Thus, we assume that the annual entry into the pool equals the number of new teachers produced the previous year and that the annual exit from the pool equals the number of new teachers produced 31 years ago plus the previous year's growth in the number of teachers demanded in the education sector. Rattner provides estimates of the numbers of new teachers produced in the 1941-1970 period. Combining these data with the numbers of new teachers produced in 1971 and 1972 (reported by the NEA), estimates of new teacher production in 1973 through 1980, and the NCES (1973) projections of the demand for teachers, we can project the size of the reserve pool in each year through 1981.

However, projections of the size of the reserve pool based on these data appear to overestimate its actual size. The reserve pool contains all persons qualified to teach, but not employed in the education sector. The demand for classroom teachers understates the number of teachers employed in education to the extent that qualified teachers are employed in nonteaching (e.g., administrative or specialist) positions.

In Projection 1, we assume an annual teacher production rate of .35; in Projection 2, we assume that the annual teacher production rate will continue to follow the (linear) 1966-1972 trend; and in Projections 3 and 4, we assume that teacher production rates decline from their 1972 levels

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*Note that we overestimate the size of the pool to the extent that persons who prepared to teach during the previous 30 years have died, become disabled, and so on. And we underestimate the size of the pool to the extent that persons who prepared to teach more than 30 years ago are still active. Like Rattner, we assume that these errors approximately offset one another.

at rates equal to the annual average rates of decline in entering college freshmen interested in a teaching career over the 1968-1972 period. We use the NCES estimates of the annual sizes of the BA class in all cases. We use the NCES projections of annual teacher demand in Projection 1; NCES estimates of annual demands for teachers are each increased by 8.8 percent (the 1970 ratio of teachers employed in nonteaching positions in education to the number of classroom teachers) in Projections 2, 3, and 4. We use Rattner's estimates of annual teacher production (1941-1970) in the first three projections. His estimates are revised downward by 10 percent in Projection 4.

The lack of data regarding the reserve pool and the behavior of the teachers in that pool is reflected in the alternative projections of the reserve supply presented in Table 7. The results vary widely, depending upon how the various assumptions are combined to generate a set of projections. Moreover, there is good reason to question all the assumptions and estimates. Prior to 1970 the reserve pool contained few, if any, teachers who had unsuccessfully sought teaching positions. Today, there are presumably numerous persons who want to teach but are unable to find a teaching position and are thus involuntarily in the reserve pool. This basic change in the nature of the reserve pool raises doubts as to the accuracy of any of the parameter estimates based upon past experience.

Despite our inability to project the reserve supply with any degree of confidence, the alternative sets of projections presented in Table 7 give a rough indication of how the anticipated continued decline in teacher production rates influences reserve supply. Projection 1 uses essentially the same assumptions that were employed in the studies reviewed earlier. Projection 2 assumes a linear trend in the teacher production rate, while Projection 3 assumes a constant rate of decline in the teacher production rate. With this exception, all other assumptions are identical in both cases. Thus, the differences between the two sets of projections indicate the impact of alternative assumptions regarding the rate of decline in teacher production rates.

Projection 3 differs from Projection 4 in only one respect, estimates of pre-1970 new teacher production are revised downward by 10 percent. Comparison of Projections 3 and 4 thus indicates the impact of assuming

that Rattner's method of estimating the size of the reserve pool overstates its magnitude by approximately 10 percent.

The Continuing Supply of Teachers

The continuing supply of teachers is defined as the number of teachers employed in the education sector less those who terminate. Previous studies have assumed that the teacher turnover rate is 8 percent. Keeler (1973) argues that changes in the age distribution of teachers and in the nature of the market for teachers will result in a substantially lower rate of teacher terminations during the 1970s and early 1980s. He suggests that a turnover rate of about 5 percent will prove to be a more accurate projection. The implication of the change in the assumed value of the termination rate is clear, and we do not provide explicit projections.

THE TEACHER SURPLUS

We have shown that teacher production rates are likely to decline throughout the decade. This, in turn, implies that the annual numbers of new teachers produced and the annual supplies of new and reserve teachers have been substantially overprojected in the previous studies. To place these results in perspective we now examine how the anticipated declines in teacher production rates might affect the teacher surplus.

Table 8 presents four projections of the teacher surplus. We use the NCES (1973) projections of the annual sizes of the BA class in every case.* The NCES (1973) projections of annual demands for teachers, revised upward by 8.8 percent, are also used throughout. In each of the projections we assume that 81 percent of the new graduates qualified to teach at the elementary level, 65.1 percent of the new graduates qualified to teach at the secondary level, and 18.3 percent** of the reserve teachers seek teaching positions each year.

Projection 1 assumes constant teacher production rates (35 percent of new graduates); Projections 2 and 4 follow the linear trend; and Projections 3 and 5 assume that teacher production rates decline from their 1972 levels at annual average rates equal to the annual average rates of

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*Recall that these may be overestimated by as much as 10 tc 13 percent.

**Recall that this estimate is based on a single year in which teachers were in relatively short supply.

Table 8

ALTERNATIVE PROJECTIONS OF THE TEACHER SURPLUS, 1973-1981
(thousands)

Year	Projection				
	1	2	3	4	5
1973	314.9	279.5	252.9	207.4	177.9
1975	437.4	380.7	286.0	296.7	204.2
1977	568.2	476.8	300.0	383.8	213.5
1979	699.0	564.0	290.0	462.5	204.1
1981	795.9	610.5	241.9	501.4	153.3

decline in freshmen interested in teaching over the 1968-1972 period. Projections 1, 2, and 3 assume Rattner's estimates of new teacher production for 1941 through 1970, while Projections 4 and 5 assume that Rattner's approach overestimates the size of the reserve pool by an amount equal to 10 percent of annual new teacher production.

Comparing these projections, we see that *if the anticipated declines in teacher production rates materialize, the magnitude of the teacher surplus will be greatly affected.* As noted above, we cannot project the size of the surplus with any precision. We can be reasonably confident, however, that contrary to the conventional view, teacher production rates will decline.

LONG-TERM IMPLICATIONS

It seems apparent that *there is considerable inertia in the supply of teachers.* The current level of teacher production depends upon the career choices made by the students who entered college four or more years ago. The size of the reserve pool, given the demand for teachers, depends upon the career choices made by college entrants throughout the past three decades. And its size will change from one year to the next only to the extent that current teacher production differs from the sum of (1) the current change in the total demand for teachers and (2) teacher production roughly 30 years ago. If the proportion of reserve teachers who seek teaching positions is roughly constant, the reserve supply will not be responsive to current market conditions.

Suppose, for example, that the net demand for teachers is roughly constant. The surplus will continue as long as the supply of eligible new graduates plus the reserve supply exceeds the net demand. Even if teacher production rates and, consequently, supplies of eligible new graduates decline sharply, the surplus will persist until the reserve pool is substantially reduced. That will occur only after a series of years in which the number of new teachers produced falls substantially below the numbers produced 30 years earlier.

The important point is that this inertia works in the opposite direction as well. Suppose that the surplus is ended in, say, 1983. The situation in that year will be approximate equality between net demand and the sum of reserve supply and new supply. But that balance will have been achieved through declines in both components of supply. And those declines will continue, at least for a while. The students who entered college in the preceding two or three years will have made curriculum choices during a period of teacher surplus and, presumably, only a small proportion of them will have entered teacher preparatory programs. Thus, the annual numbers of new teachers produced will continue to decline, the reserve pool will contract yet further, and the supply of teachers will be yet smaller. After three or four years, the college students who entered after the end of the surplus will begin to graduate, teacher production will begin to grow, and annual new supplies of teachers will begin to grow. But the reserve pool, and, consequently, the supply of reserve teachers, will continue to contract until new teacher production climbs to levels greater than the levels of new teacher production 30 years earlier. And since the surplus is not likely to end until teacher production has fallen well below the levels of 30 years earlier, this climb will require some time.

In sum, it appears that if and when the surplus ends, the inertia in the system will lead to the almost immediate onset of a substantial and lengthy teacher shortage.

III. THE POLICY ISSUE

Since the current teacher surplus emerged, policymakers have focused on the undesirable aspects of the surplus--the frustration and disappointment of trained professionals unable to obtain a teaching position, the associated waste of resources invested in teacher training, and the "cost" in educational quality that presumably results from not taking advantage of the opportunity to utilize these teachers in our schools. These concerns have led to general acceptance of the notion that achieving balance in the market for teachers is a major objective of educational personnel policy. Our analysis, however, suggests that these concerns are somewhat misdirected. Important considerations have thus far been overlooked in the policy debate. Taking them into account, there is good reason to suspect that an aggregate imbalance in the market, despite its undesirable aspects, might be preferred to balance.

THE ROLE OF THE MARKET

The primary role of any labor market is resource allocation. Society has certain needs. But in order to apply its human resources to meeting those needs, two issues must be resolved: What proportion of the available resources (labor) should be devoted to each need? And how can those respective amounts of resources be directed into activities serving its respective needs?

The labor market is one mechanism for solving these problems. Individuals choose among occupations on the basis of the rewards (both pecuniary and nonpecuniary) each offers. And employers offer rewards in an attempt to attract qualified employees. The concept of an occupational labor market is an abstraction of the interactions between employers and potential employees: some subset of the qualified individuals who are attracted to an occupation are employed in some subset of the positions employers seek to fill.

When the wage rate in an occupation is flexible, the market will automatically "clear" in the sense that every qualified individual who seeks a position in the occupation will obtain one, and every position

employers seek to fill will be filled. If, for example, there were a shortage of labor in an occupation, the wage rate would be driven up as employers bid against one another in competition for the relatively few qualified persons seeking positions in the occupation. As the wage rate increases, the occupation becomes more attractive (relative to alternatives) and qualified individuals engaged in other activities would be attracted into the occupation. Simultaneously, employers facing increased personnel costs cut back the number of positions they seek to fill. The converse obtains in the case of a market in which there is a surplus. In either case, the wage adjustment process continues until the point at which the market clears. Thus, in the absence of barriers to the wage adjustment process, a labor market is self-regulating in the sense that imbalances will be automatically eliminated.

This discussion of the theory of labor markets has important implications for an analysis of the market for teachers.

First, the teacher labor market would automatically clear if there were no barriers to the market adjustment processes. In other words, *an imbalance in the market for teachers is not itself a problem. It is a symptom of the presence of barriers to the market adjustment process.* It follows that *restoring balance in the market for teachers is not an appropriate objective for educational manpower policy. Rather, policymakers should focus on achieving a socially desirable allocation of human resources to education.*

Second, there is no evidence that, given the existence of barriers to adjustment in the market for teachers, a socially desirable allocation of resources to education would be obtained if the market were cleared. In fact, as long as the barriers to adjustment are present, a continuing imbalance in the market might be needed to compensate for them. Thus, if the barriers cannot be eliminated, *the appropriate objective of policy in the market for teachers might be to maintain a continuing imbalance.*

Finally, market clearing in the teacher labor market would imply an optimal allocation of human resources to education only if there were no deviations between private and social costs and benefits in any labor market, and all other labor markets also cleared. If these conditions

were not satisfied, *imbalances in the teacher labor market might be needed to achieve the socially desired pattern of resource allocation.*

In sum, there are basically two broad strategies open to educational personnel policymakers: They can attempt to eliminate the barriers to adjustment in the market for teachers. Should they succeed, the market will automatically clear. Alternatively, policymakers can accept the presence of barriers to adjustment in the teacher labor market, because those barriers have certain desirable attributes that more than compensate for whatever amount of resource misallocations they engender or because it is infeasible or impossible to eliminate them. In either case, policymakers should attempt to achieve the best attainable pattern of resource allocation, which, as noted earlier, may require a continuing imbalance.

BARRIERS TO ADJUSTMENT IN THE TEACHER LABOR MARKET

Barriers on the Supply Side

The supply side of the market contains two structural features that distinguish professional labor markets from other types of occupational labor markets. The first of these is the existence of separate and independent institutions that provide the training required for initial entry into these professional markets. Neither the ultimate employing institutions nor organizations of the employees (e.g., unions) control these institutions providing initial-entry professional training.

The problem of separation is exacerbated by the second distinguishing supply feature of all professional labor markets--the substantial amount of time needed to obtain the set of requisite initial-entry skills. This training delay creates the dominant characteristic of all professional labor markets--the lagged response of new supplies of individuals to changes in demands for professional services. Because of this supply lag, current supplies of eligible new teachers depend upon previous decisions made by individuals and institutions, whereas the current demand for new hires reflects decisions made by the LEAs during the current time period.

The supply side of the market for teachers does differ from that of most other professional labor markets in one important respect--the presence of a large reserve pool of teachers. Labor force participation

rates of women are substantially lower than such rates among men. Moreover, the life cycle of employment among women has differed from that of men. Specifically, women have been more likely to delay initial entry into the labor force and to leave and reenter the labor force after initial entry. These patterns combine with the extensive involvement of women in the education profession to create a situation in which at any time there is a substantial number of trained professionals not in the labor force. Moreover, factors determined outside the market (e.g., patterns of family formations) influence the number of such persons who seek entry into the education sector.

Barriers on the Demand Side

The demand side of the market for teachers is dramatically different from that of most other professional labor markets. Teachers are employed by nonprofit institutions producing a public good--education. Moreover, public institutions are in the vast majority. Less than 10 percent of all instructional staff employed in elementary and secondary education hold positions in private schools. Thus, the demand for teachers is essentially determined by the community's allocation of funds to the supply of public education which, in turn, reflects the local population's perceptions of its educational needs and its ability and willingness to allocate funds to meet those needs.

While there is little argument that education is valuable, its value cannot be measured with any degree of accuracy. Further, education, particularly at the elementary and secondary levels, is widely believed to provide benefits and advantages to society in general which substantially augment the benefits and advantages directly accruing to the children receiving the education. Again, these social benefits cannot be measured with any degree of precision. Finally, the dominant educational technology, the self-contained classroom, focuses attention on the classroom teacher as the key element in the educational services a child receives. However, the contribution of the classroom teacher has proved to be as impossible to measure operationally as the value of education itself. In consequence, the "quality" of a local educational agency (LEA) has come to be measured in terms of the amounts and mix of inputs, particularly teachers, it uses.

In comparing two school districts, for example, the one that offers lower class sizes (more teachers per pupil) is generally viewed as superior.

The important point is that the decisions regarding the size of a district's budget and, hence, its demand for teachers are largely made outside the market. Moreover, once these decisions are made, the district's freedom to respond to changing conditions in the market by changing its allocation of funds among various school inputs is severely constrained by public expectations.

Internal Barriers to Adjustment

The market for elementary and secondary classroom teachers is highly localized. Local educational agencies tend to hire from local teacher training institutions which, in turn, have a relatively narrow view of their "clientele." State credentialling requirements, although partially offset by interstate reciprocity agreements, reinforce these tendencies. Nonvesting or partial vesting in pension plans, the absence of nationwide employers who induce a national perspective through their internal personnel assignments, and the predominance of salary schedules based on experience within a district (perhaps offering partial credit for experience in other districts) combine to reduce geographical mobility beyond the entry level. Finally, the extensive involvement of women, who tend to be secondary wage earners and geographically tied to the area near their spouses' place of work, undoubtedly contributes to market localism.

A related characteristic of the market for teachers--one which it shares with all professional labor markets--is the high degree of skill specialization within the occupation. Different "types" of teachers (elementary teachers, secondary biology teachers, reading specialists, and so on) have received different types of training and are presumed to be relatively poor substitutes for one another. The use of teachers outside their fields (e.g., an English teacher teaching physics) is generally considered to have an adverse impact on the quality of education.

The localized scope of the market, in combination with the high degree of skill specialization, creates an extensive series of overlapping submarkets which are largely independent of one another. Each individual

submarket is distinguished from the others in terms of its geographical domain and the types of teachers included in it.

The primary implication of this aspect of the market is that imbalances occur on the local level with respect to particular types of teachers. Thus, different submarkets may simultaneously exhibit imbalances of varying severity in both directions. A surplus of teachers of one type in one submarket will not be alleviated by interskill or geographical shifts into areas where there are shortages.

Barriers to Wage Adjustment*

The compensation system that predominates in the education sector is quite different from those used in other professional labor markets. Local educational agencies generally use a uniform salary schedule that specifies a teacher's salary as a function of his or her educational level and experience. There are, of course, differences among LEAs in terms of the parameters of the schedule (the number of experience steps at each educational level, the size of the salary increment associated with each step, and so on) as well as the overall level of the schedule. However, within a district, teachers having the same amounts of education and experience will tend to receive the same compensation regardless of their skills or abilities.**

Other labor markets recognize both skill and ability differences in their salary systems. Moreover, within any skill speciality in nonteaching professionals there will be large differences in the salaries of individuals working for the same employer reflecting their employer's perceptions of their relative abilities.

The predominance of the uniform salary schedule in education severely limits a district's flexibility with respect to changes in its salary level. Separate adjustment of specific salaries or segments of the schedule is precluded. Rather, the entire schedule must be shifted if there is to be any change at all. Reductions in the salaries of teachers currently employed

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*See Kershaw and McKean (1962) for an extensive analysis.

**Some LEAs offer additional pay to a teacher that undertakes additional duties (coaching an athletics team, working with a student group, and so on), but that is not pertinent to our discussion.

in a district are barred by contractual agreements, and newly employed professionals must be compensated according to the same schedule. Hence, neither the salary structure as a whole, nor any of its component parts, can be reduced.* Increasing teacher salary levels is, of course, possible. However, because the entire schedule must be increased if any component of the schedule is to be increased, the cost to the district of increasing its wage offer to teachers in any particular part of the schedule is equal to the cost of providing that increase to all the teachers it employs.

The limitations on the LEA's ability to respond to changes in market conditions are clear. A district faced by a teacher surplus does not have the option of reducing the wage rate offered to potential new employees and thereby expanding the size of its staff, given its budget; it can increase its wage offers to potential new hires only at a very large cost.

The second important implication of the uniform salary schedule is that interskill salary differentials are precluded. Other professional labor markets respond to shortages or surpluses of persons having certain skills. If professionals having one type of skill are relatively abundant within an occupation, the salary level of the professionals with a different skill will rise relative to that of the former. Some professionals of the former type will be induced to shift their interests and skills (through formal or informal in-service training) into the latter field. Further, students preparing to enter the occupation will be induced to specialize in the latter field instead. Thus, in other professional labor markets, interskill salary differentials provide an adjustment mechanism that reduces the extent of market differentiation due to skill specialization by inducing mobility between skill-defined submarkets at both the entry level and beyond. And the absence of such differentials exacerbates the tendency toward "balkanization" in the market for teachers.

Consequences of the Barriers to Adjustment

The barriers to market adjustment noted above underlie imbalances in the market for teachers. At any time, there is, in each local area, a

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*A salary schedule can be effectively reduced if its rate of growth, over time, is less rapid than the pace of inflation or the growth rate in comparable occupations or in other school districts.

certain number and mix of persons qualified to teach, some proportion of which will actively seek teaching positions. At the same time, local LEAs have certain funds available for the purchase or hire of school inputs, some proportion of which will be allocated to the employment of professional staff. If the funds allocated to the employment of educational professionals are not sufficient, given teacher salaries, to employ precisely the number and mix of teachers seeking positions, a surplus results. If, on the other hand, given teacher salaries, those funds provide for a greater number of positions than there are qualified teachers seeking positions, there will be a teacher shortage.

The number of persons qualified to teach reflects the choices made by a generation of college students. And the proportion of those qualified who seek positions depends upon the attractiveness of a teaching position relative to alternative occupations. The relative attractiveness of a teaching position, in turn, depends upon the characteristics of the occupation (salary level, nonpecuniary returns to teaching, and the like) in comparison to the characteristics of other occupations. However, the number and mix of profesisonal positions that LEAs seek to fill depends upon the communities, resources, and their perceptions of their needs, both public and private. An imbalance between these two disparate decision processes comes as no surprise.

In principle, the market should respond by adjusting wage levels. In the case of a surplus of teachers, for example, wage offers to potential new hires should decline. This would have the twofold effect of making teaching relatively less attractive (and thus reducing the proportion of qualified teachers seeking positions) and, simultaneously, expanding the number of positions LEAs will attempt to fill (since their available funds will support more positions as the costs of filling a position declines). Further, if salary offers to entering teachers were to decline, future cohorts of college students would find the occupation relatively less desirable; a smaller number of them will prepare to enter the profession; and, in the future, there will be relatively fewer qualified teachers.

However, the uniform salary schedule is not flexible downward and is very (though not completely) inflexible upward. The inflexibility of the local districts largely precludes market adjustments of the sort required

to bring about a local balance. And the high degree of localism in the market, in both the geographical and skill dimensions, limits intermarket adjustment. In sum, the local market will not clear and, barring some outside intervention, will not itself adjust to eliminate the imbalance.

Policy Implications

As noted earlier, policymakers have basically two alternatives: eliminate the barriers to adjustment, or accept their existence and work to achieve the best attainable allocation of resources to education. In view of the nature of the barriers to adjustment in the market for teachers, the former does not appear promising. The major barriers to adjustment in the market are rooted in factors largely beyond the control of educational personnel policymakers--such as independence of Institutions of Higher Education (IHEs), local control of schools and school spending patterns, and the uniform salary schedule. Eliminating these factors is probably infeasible, even if that were desirable, and each is generally believed to convey benefits upon society that possibly outweigh its negative impact on the teacher labor market.

Moreover, if elementary and secondary education does, in fact, provide benefits to society in excess of the benefits that accrue to the particular students receiving that education, the market adjustment process may not generate the socially optimal solution, even in the absence of barriers. A fundamental assumption in the argument (that the market, if unhindered, will provide the optimum allocation of resources) is that private costs and benefits do not depart from social costs and benefits. Should that assumption be violated, the "free market" solution may, itself, be undesirable. It is worth noting, at this point, that major interventions in the educational system in the past (e.g., the Elementary and Secondary Education Act of 1965) were, in part, justified by the argument that communities were unable and/or unwilling to provide the level of educational services that the society as a whole desired.

In sum, there are substantial barriers to the adjustment process in the market for teachers that effectively preclude the automatic achievement of balance. Eliminating these barriers appears to be politically infeasible and, possibly, undesirable on other grounds. *Thus, the major*

policy question that must be addressed regarding educational manpower is: Given the continued presence of these barriers in the market, should policymakers intervene to affect the imbalances that arise from these barriers?

CONSEQUENCES OF IMBALANCES

Distributional Effects

It must be recognized that the social costs and benefits associated with imbalances in the market arise in the various submarkets of the market for teachers. A shortage or surplus of, say, elementary teachers in a certain metropolitan area may impose costs and benefits on that community as a whole and on the LEAs, teachers, children, and so on in that community. But it is of little consequence to the individuals, groups, and institutions that do not participate in that submarket. Accordingly, the net impact of a policy is the sum of its impact on each submarket in the nation.

Virtually any policy that affects more than one submarket is likely to improve the situation in some, but simultaneously aggravate the situation in others. For example, a policy of curbing teacher production to reduce teacher surpluses will, if successful, ameliorate the situation in submarkets where there is a teacher surplus. But the situation in submarkets where there is a teacher shortage will become more serious. The desirability of such a move depends upon the relationship between the aggregate gains in those markets where the situation is improved and the aggregate losses in those markets where the situation is worsened.

Furthermore, policies oriented toward the reduction of an aggregate imbalance will not necessarily reduce the costs (or increase the benefits) associated with the imbalance, even if they are successful in reducing the magnitude of the aggregate imbalance. In fact, they may significantly increase the costs and/or reduce the benefits incurred by society. Suppose, for example, that a teacher surplus imposes net social costs on society that can be reduced if the magnitude of the surplus is reduced. Suppose, further, that there is a national teacher surplus of, say, 200,000 teachers resulting from a combination of surpluses in various submarkets and

shortages in other submarkets aggregating to 300,000 and 100,000 respectively. A policy that succeeds in increasing the size of a shortage in every submarket where there was initially a shortage, while having no effect on any submarket in which there was a surplus, would reduce the size of the national teacher surplus. Yet such a policy obviously has no impact on the social costs incurred in surplus submarkets.

Quantity and Quality Interactions in the Market

The absence of salary differentials according to skill and ability in the education sector's compensation system induces a positive relationship between the number of teachers available to a district (relative to its demand) and the quality of education in that district. In brief, the quality of education in a district depends upon the quality of its staff--the abilities and training of the teachers. A district with teachers of relatively poor ability or teachers assigned to positions for which they have not been trained presumably offers a lower quality of education than the district that employs teachers with more ability or skills better matched to their assignments.

However, aside from its teacher salary structure, there is little than can be done to make the district more attractive to teachers. Greenberg and McCall (1973a, 1974) have shown that the characteristics of the student body of a school or a district are important nonsalary factors that affect a teacher's decision regarding the attractiveness of a position. They have also shown that other factors, such as the presence of innovative programs, the provision of teachers' aides, and so on have little impact on the teacher's decision.

Although a district cannot change the characteristics of its student body, it is possible to improve the quality of the education it provides by raising its salary level and attracting a greater number of teacher applicants among which it can choose. But, unless its action induces additional qualified teachers to enter the market, it will improve itself at the expense of some other district. Extending this argument to the education sector as a whole, we can see that there is a relationship between the aggregate number of teachers seeking positions and the quality of education in the nation. An overall improvement in educational quality

can be obtained by inducing some of those qualified teachers engaged in other activities to enter teaching. But the uniform salary schedule precludes a district from taking steps that will attract only "able" teachers; that is, increasing teacher salary levels will also attract additional numbers of teachers who are less "able."

Note that somewhat similar remarks apply along the skill dimension. A district facing a shortage of, say, English teachers cannot simply raise the salary levels of those teachers in order to attract additional professionals qualified to teach English. Rather, if the district chooses not to make do with the available applicants, it must raise its entire salary schedule. This action will presumably attract additional English teachers, but it will also attract additional mathematics teachers, physics teachers, and so on, thus generating local surpluses in all areas.

Effects of a Shortage

A shortage in a submarket of the teacher labor market will directly increase the cost of providing a given quality of elementary and secondary education. This occurs because teacher wages rise, because lower-quality teachers are obtained, or a combination of both. An excess demand for (i.e., shortage of) teachers will tend to raise the price (wage rate) of teachers. Since teacher salaries are the principal component of the total costs of elementary and secondary education, with professional staff salaries accounting for 60 to 70 percent of the total current expenditures of LEAs, a price increase in this basic educational resource input will cause total educational expenditures to increase, if total educational services are to remain at their previous levels.

Even more important than these economic cost implications, however, may be the effects that shortage will have on the quality of educational services obtained. In order to avoid shortages of teachers, some LEAs may have to accept lower-quality teachers than they would prefer to hire. This may then result in poorer quality of the educational services for children in that school.

The burden of these costs is borne initially by the community and its children. Ultimately, the nation as a whole may bear part of this burden if it attempts to provide some compensatory education later to over-

come the lower-quality educational services obtained during the shortage period. There is also an equity problem since the burden of these costs may not be proportionately borne by all LEAs and all children. Indeed, general shortage situations can exacerbate distributional problems, since relatively disadvantaged LEAs are unable to compete for these scarce resources on equal terms with advantaged or weathier LEAs. Not only will there be a cost, but the incidence of this cost occurs most frequently among the poor and disadvantaged segments of the population.

The costs associated with teacher shortages have been clearly recognized in the literature. The gains or benefits that accrue to teachers in a shortage situation have not been as frequently studied, however. In the first place, there is pressure to increase teacher salaries, fringe benefits, and working conditions. Second, teachers are likely to have a broader range of choice among alternative positions; they are more likely to be able to obtain a position in an attractive district in a relatively unattractive one. And, within a district, the teacher is likely to have more choice in terms of an assignment. Finally, even teachers who are less "able" can find a position if they are participating in a submarket characterized by teacher shortages. Thus, the extent to which teaching resources are "wasted" declines as the magnitude of the shortage increases.

The net effect of a shortage is difficult to assess. First, we cannot operationally measure the gains obtained by teachers; nor can we quantify the costs associated with lower quality. Moreover, even if all those costs were quantifiable, there remains the difficult problem of comparing the value of the gains to the teachers with, for example, the value of the losses to the LEAs and children. Not only may their specific valuation per unit of gain and loss differ, but society also may prefer to aid one group relative to another.

Effects of a Surplus

The same problems arise when we try to assess the net effects of a surplus condition in the teacher labor market. In this case, however, the gainers and losers differ, as do the specific types of gains and losses. LEAs and children currently receiving educational services are the principal gainers. Under surplus conditions in a submarket of the teacher labor

market, the relative cost of education will decline, the quality of current educational services will increase, or some combination of both will occur. LEAs, for example, will have more choice among applicants; and, hence, will be more able to choose teachers whose abilities and skills are more suited to the LEA's needs. There may also be a distributional benefit if the surplus is sufficiently large to eliminate shortages in all LEAs, including the most disadvantaged ones.

The costs of a surplus in the teacher labor market involve primarily the loss in potential output associated with unused or underused resources. Teachers unable to obtain a teaching position may suffer losses in personal income and job satisfaction, while society foregoes the additional tax revenue from that income plus the loss of the additional output that could have been generated had the resource been fully utilized.

Again, neither the gains (to the community and its children) nor the losses (to teachers and society) can be quantified. And, even if they could, we would still face the problem of deciding whether the gains were "worth" the losses.

IMPLICATIONS OF THE ANALYSIS

In general, social problems and the extent of their severity are defined by the costs or penalities imposed on some (or all) of the population or some social institution. Intervention to solve or alleviate these problems is warranted when the costs of the intervention are less than the resulting reduction in the social costs imposed by the existence of the problem. Hence, educational manpower policies should respond to the problems underlying imbalances in the market if, and only if, some net social benefit can thereby by obtained.

However, it is difficult to assess the relative costs and benefits of imbalances in the teacher labor market for several reasons. First, there are a number of different groups of individuals who are affected by these imbalances, and not all groups are adversely affected by a particular type of imbalance. Second, the degree of the effect differs among the groups. Third, the effect of an imbalance on any one group also depends on the type of imbalances; shortages are advantageous to some groups and disadvantageous to others; surpluses reverse these effects,

albeit not necessarily in the same degree. Finally, no quantitative measures exist that can be used to assess the magnitudes of the costs and benedits imposed by imbalances.

The primary implication of these remarks is that, given its structure and characteristics, we cannot specify the desired aggregate state of the market for teachers. Consequently, while we can attempt to design policies to achieve any particular state, we cannot evaluate tnose policies. Note that this is not a technical problem that could be resolved by further research. Although many technical problems are encountered in assessing the state of the market, fundamental value judgments regarding the distribution of gains and losses are also involved.

To review briefly, suppose that there is an aggregate surplus in the market. Suppose, further, that we have identified a policy option that, if implemented, would reduce the size of the surplus. In deciding whether or not that policy should be implemented, a number of technical problems arise: Which submarkets would be affected? In what ways and by how much would each submarket be affected? And so on. But suppose that all these problems were solved. Suppose that we knew precisely the impact of the policy on each individual, group, and institution concerned. We would then face the basic issue of deciding whether the gains of those who benefit from the policy warrant imposing the costs that would be suffered by those who lose as a result.

In sum, before educational manpower policy can proceed, concerned policymakers must resolve the basic issue: *How are the benefits and costs that accrue to teachers to be weighed vis à vis the benefits and costs that accrue to students, the community, and the society as a whole?*

IV. NEXT STEPS IN THE EDUCATIONAL MANPOWER DATA SYSTEM

Educational manpower data provide the basis for understanding the market for teachers, assessing its current and likely future state, and anticipating and responding to its problems. This study was commissioned in part to map the changes needed to improve the capability of the educational manpower data system to meet these needs. In this section, gaps in the existing data are identified and the acquisition of certain data on a more detailed and timely basis is suggested.

GAPS IN THE DATA

We discussed in Section II the limitations of the available data regarding the aggregate demands for and supplies of teachers. In brief, we found that the data needed to project the demands for teachers are quite accurate and readily available. For the most part, it appears reasonable to expect past trends in the underlying parameters to be continued and, in any event, the projections are relatively insensitive to changes in the underlying parameters. Hence, even if they do depart from past trends by a small amount, the demand projections are not much affected. The exception to these statements is the teacher/pupil ratio.

The situation is much different on the supply side. There we lack accurate estimates of past and current values of many of the underlying parameters. And, even if accurate data were available, the future continuation of past trends is questionable. Moreover, the projections of the supply of teachers are relatively sensitive to many of these parameters.

In Table 9 we list the factors that enter a projection of the state of the market for teachers and indicate the quality of the available data regarding each factor* (*how accurately* the available data measure the past and present values of the factor and *how likely is continuation of existing trends* in the factor, independent of whether or not we have accurate estimates of what those trends are). We also indicate the extent to which we believe further research on the determination of each factor is needed.

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*See Section II of this report and Carroll and Ryder (1974) for details.

Table 9

THE QUALITY OF THE AVAILABLE DATA

Factor	Accuracy	Likelihood of Trend	Need for Further Research
Demand			
Size of school-age population	High	High	Low
Enrollment rates	High	High	Low
Teacher/pupil ratio	High	Fair	Fair
Supply of eligible new graduates			
Number of new graduates	High	Fair	Low
Teacher production rate	High	None	High
Proportion of qualified new graduates who seek positions	Fair	Low	High
Reserve supply			
Size of reserve pool	Low	None	High
Proportion of reserve teachers who seek positions	None	None	High
Continuing supply			
Number of teachers employed in teaching	High	High	Low
Teacher termination rate	Low	Low	Fair

The *size of the school-age population* and *enrollment rates* are easily projected. Highly accurate data are readily available; there is no reason to suspect that existing trends in the underlying parameters will not be continued; and the demand projections are relatively insensitive to the changes in these factors that might reasonably be expected.

The *teacher/pupil ratio* is accurately measured by the available data. However, changes in the financial situation of school districts (e.g., inflationary pressures) may lead to departures from previous trends, and the demand projections are relatively sensitive to this factor.

The NCES annually projects the *number of new college graduates*. The underlying data are quite accurate. However, there is some question as to whether past trends are being continued, since it now appears that enrollment levels in higher education, upon which projections of annual BA classes

are based, have been overprojected. It is not yet clear whether this is a departure from past enrollment trends or merely a temporary perturbation. In any event, projections of the state of the market are relatively insensitive to this factor.

The NEA provides annual data regarding the *teacher production rate*. We have no reason to believe that the raw data are inaccurate. But it is certain that past trends in this factor are not being continued. We have explored some of the implications of alternative assumptions regarding future trends in this key parameter and found that projections of the market are very sensitive to its assumed value.

The NEA also issues annual reports on the proportion of qualified new graduates who entered teaching positions. This proportion deviates from the *proportion of qualified new graduates who seek positions* to the extent that individuals who seek positions are unsuccessful. Assuming that prior to the teacher surplus most qualified new graduates were successful if they sought positions, these data are probably reasonable estimates of the past values of the parameter in which we are interested. However, the estimates that date from the emergence of the surplus do not reflect the proportion of qualified new graduates who seek positions. Moreover, the value of this parameter probably deviates from its past trends. There has been a fundamental shift in the rates at which students engage in teacher training programs. There is very good chance that this shift will be reflected in the rates at which qualified new graduates seek positions.* And projections of the supply of teachers are fairly sensitive to this parameter.

We have absolutely no idea of either the *size of the reserve pool or the proportion of reserve teachers seeking teaching positions*. Nevertheless, it is possible to estimate the approximate total number of teachers

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*Traditionally, large numbers of students have qualified to teach, although they were not primarily interested in a teaching career. The decline in the rates at which students enter teacher preparatory programs may reflect changing student perceptions of the profession as a second career option. Alternatively, it could be argued that students interested in pursuing a teaching career are more affected by changing market conditions since a change in the market is potentially more important to them than to students preparing for a second career option. Either way, the proportion of qualified new graduates who actively enter the market is likely to be affected.

produced over the past 25 or 30 years (not very accurately) and, by subtracting both the number of teachers currently employed in education and the estimated number of qualified teachers who have left the teaching force because of death or disability, we can estimate the aggregate number of teachers in the reserve pool. However, this approach provides no indication of either the demographic composition of the pool or the activities in which reserve teachers are currently engaged. Yet both of these considerations are likely to have an impact on the proportion of reserve teachers that seek positions. The available estimates of that parameter are provided by the NEA (based on 1960 data) and Rattner et al. (based on 1970 data). Neither takes account of either the changing composition of the pool or the changing situation in the market.

The *number of teachers employed in teaching positions* is easily projected, during a surplus, by assuming that all available positions will be filled and then using the projected demand for teachers. Since the demand for teachers can be projected with considerable confidence, this approach presents no problems.

The NCES, in a 1959 study, estimated that the *teacher termination rate* was 8 percent. That estimate has been used ever since. Keeler (1973), however, argues that the rate at which teachers terminate varies with market conditions, and Greenberg and McCall (1974) show that the termination rate is influenced by the demographic composition of the teaching force. In view of these arguments, we must conclude that the available estimate is probably inaccurate, and there is no reason to suppose that in the future 92 percent of the teachers employed in teaching positions will continue from one year to the next.

FILLING IN THE GAPS

In responding to the limitations of the available data, *the first priority should be to analyze the likely future trend in the teacher production rate.* This is the critical parameter in projections of the supply of teachers, and conclusions regarding the likely future course of the teacher surplus are heavily influenced by its assumed future values. There is considerable evidence that college students are responding to the market situation. Thus, past trends in this parameter are not likely

to be continued into the future. However, we have no reliable estimates of what teacher production rates are likely to be in the future.

Data are needed on the level of the individual regarding program or curriculum choices and the factors that influenced those choices. Analyses of these data should focus on identifying the relationships between the state of the market for teachers and the individuals' preceptions of how they will fare should they pursue a teacher preparatory program, on the one hand, and their choices among programs, on the other hand. Individuals' decisions to transfer between teacher education and alternative programs and the factors that influence these decisions, particularly the state of the teacher labor market, should also be studied. The objective of these studies should be the development of an empirical model of individual behavior that can be used to identify student responses to conditions in the market for teachers. The ACE has collected follow-up data on samples of students who were included in their freshmen surveys. But these data provide no information as to the factors that influenced program choices. A revised version of the ACE follow-up survey identifying persons qualified to teach and their expectations regarding the opportunities of a teaching career would provide the data needed to project the proportion of college graduates who would qualify to teach.

The *second priority should be to develop reliable estimates of the reserve supply*. This requires the development of accurate estimates of the size and composition of the reserve pool and the identification of the rates at which various types of reserve teachers seek teaching positions. The extent to which the state of the market affects each of those rates must also be identified. Our projections suggest that, if Rattner's method of estimating the size of the reserve pool is reasonably accurate, it will grow at a rapid rate throughout the decade. Unless the proportion of reserve teachers seeking positions drops rapidly, the reserve supply will become an increasingly important issue. Moreover, the reserve pool appears to provide considerable inertia to the supply of teachers. If true, this component of supply plays a crucial role in the dynamics of the market and needs to be understood.

The first step in dealing with this problem would be to survey a sample of the U.S. population. The survey should be designed to obtain

estimates of the numbers of qualified teachers, by skill specialization and location, who are not currently employed in education. It should also identify the activities in which these teachers are engaged and the likelihood that they will at some future time attempt to enter the education sector. It is particularly important that the survey identify the conditions that cause individuals to enter teaching (e.g., the stage of family development, the loss of a nonteaching position currently held, teacher salary levels relative to salary levels in other occupations, and so on).

Once such data were available, they should be analyzed to determine the relationships (if any) between the composition of the pool of reserve teachers and the composition of the U.S. population. If, for example, the distribution of reserve teachers were similar to that of the college-graduate population, the local reserve pool in some future year could be estimated as the change in the total size of the pool (using a method similar to Rattner's) weighted by the distribution of the U.S. college-graduate population. This estimation procedure would be much easier and less expensive than resurveying the population. The data should also be analyzed with a view toward discovering the factors that influence a reserve teacher's decision to seek a teaching position. The objective of the studies should be to develop models to project the proportion of reserve teachers that will seek entry as a function of the distribution of those in the pool, given labor market conditions.

Analyzing the proportion of eligible new graduates seeking teaching positions is the third priority issue. Changes in this parameter can offset or exacerbate trends in the teacher production rate. It thus exerts an important influence on the projection of the supply of teachers. The need in this area is for follow-up data (at the individual level on new graduates qualified to teach), which indicate whether or not they sought teaching positions and identify the factors that influenced their decisions.

We would give *fourth priority to analyses of teacher termination rates.* The data needs here are twofold: We need data describing the composition of the teaching force, and we need detailed estimates of teacher termination rates by "type" of teacher. Both types of data are now collected

by the NEA at five-year intervals. Detailed analyses of those data have not yet been undertaken, however.

Studies of the factors that influence school district budgets and teacher salary levels are fifth in priority. If these factors can be identified and projected, it is possible to provide a method for translating those projections into estimates of the teacher/pupil ratio (see Carroll, 1973).

The NCES is updating its projections of the annual numbers of new college graduates, and the remaining parameters needed to project the teacher surplus require no further refinement.

ADDITIONAL EDUCATIONAL MANPOWER DATA NEEDS

Ideally, the educational manpower data system should be capable of routinely projecting the supply of and the demand for teachers, by skill specialization, for each submarket of the labor market for teachers. The system is not now capable of meeting these needs.

Policymakers concerned with the market need to be able to monitor its likely future performance systematically, at regular intervals, if they are to anticipate developing problems and respond to them. Their ability to identify instances where intervention in the market is necessary, to choose the appropriate points at which they should intervene, and to choose appropriate methods for intervening depends upon the accuracy and reliability of the information available to them. If the educational manpower data system is to serve these needs, it cannot simply collect aggregate data on those aspects of the current state of the market that are readily measured. Rather, it must be capable of routinely providing *detailed, future oriented,* and *complete* data regarding the performance of the market.

As we noted earlier, the costs and benefits that arise from the performance of the market are imposed at the local level. Detailed data can reveal problems concealed (i.e., "netted out") at higher levels of aggregations. Moreover, gross interventions may alleviate problems in some submarkets but may simultaneously exacerbate problems in others. Thus, policymakers need detailed information on the situation at the level of the submarket if they are to provide a complete assessment of the state of the market and selectively intervene in the particular submarkets, or types of submarkets, where there are problems.

Data regarding the current, or past, state of the market and its various submarkets provide baseline information and are valuable in support of research on the market and its behavior. However, it is the *likely future state of the market* that is of concern. The forces in the market are dynamic and the state of the market changes over time. Policymakers need to be able to meet problems when they arise. This requires that problems be anticipated. Moreover, the substantial lags in the system limit the immediate impact of an intervention. This implies that interventions should be undertaken *before* problems emerge.

Finally, complete data are needed. Estimates of likely future demands for teachers, even at a detailed level, are useless unless they can be compared to estimates of likely future supplies. It is, after all, the interaction of the two that is of concern. Admittedly, there is a conflict between data completeness and data accuracy. Nonetheless, incomplete data, no matter how accurate, are of relatively little value.

We should note that these data needs are not limited to policymakers. The individuals, groups, and institutions that participate in the market for teachers make current decisions in anticipation of the likely future state of the market. Many, though not all, of the problems that hinder adjustment in the market are essentially limitations on the detail, future orientation, and completeness of the data upon which they base their decisions. For example, the separation of teacher-producing and teacher-utilizing institutions is of concern because it limits the extent to which students make career choices in the light of accurate and reliable information regarding their likely future prospects should they choose to pursue a teacher preparatory program. One of the primary problems imposed by the uniform salary schedule is that it restricts the LEA's ability to signal differential demands for teachers of different skills and abilities. The localism of the market similarly limits the extent to which differential demands among different geographical submarkets are recognized. A data system that nets policymakers' needs might simultaneously reduce the magnitude of the problems in the market by enabling its participants to make decisions in accordance with the state of the market.

DEVELOPING A DETAILED DATA SYSTEM

We have noted the importance of developing detailed projections of the state of the market for teachers. This market can be defined as an extensive network of overlapping, partially independent submarkets--a notion crucial to analyses of the market for teachers because, for most purposes, the submarket is the unit of concern. However, we do not at present have an operational definition of the submarket. We do not know how many distinct submarkets exist in the United States; nor do we know the size or scope of any particular submarket. Thus, before we can begin to collect or organize data on the level of the submarket, further research on the concept and measurement of submarkets will be required.

Submarkets are distinguished from one another in two dimensions--geography and skill specialization. What is needed, then, is an operational definition of the size and scope of a submarket. It must be recognized, however, that the distinctions along either dimension are behavioral, not objective. If an LEA typically recruits teachers from a certain IHE, then, from the perspective of that IHE, the LEA is a part of the submarket in which it (the IHE) participates. Note that the physical distance between the IHE and the LEA does not enter. Similarly, if an LEA does not distinguish between two types of teachers in its hiring decisions and staffing patterns, then from the perspective of the LEA, those two types of teachers are included in the same submarket regardless of what may have been substantive differences in their respective preparatory programs.

The point of the argument is that we cannot simply divide the United States into a number of mutually exclusive and exhaustive areas (according to some geographical criterion) and divide all teachers into a number of mutually exclusive and exhaustive types (according to differences in their training). Rather, to investigate the size dimension of submarkets, the IHE placement patterns, the LEA recruiting patterns, and the application patterns of individual teachers must be analyzed to discover consistent relationships. Similarly, the hiring and staffing patterns of LEAs have to be examined to investigate the skill dimension.

The logical starting points for these efforts are the large metropolitan areas and the large IHEs. The flows of newly trained teachers into the former and out of the latter should be studied with a view toward

identifying stable patterns. Similarly, the flows of teachers from the reserve pool into the metropolitan LEA should be studied. The aim of these efforts should be to develop a method for identifying the LEAs whose demands for teachers are relevant to the decisions made by any particular IHE, or set of IHEs (with respect to their teacher preparatory programs), and by the students in that IHE (with respect to their career choices). These efforts should, at the same time, aim toward developing a method for identifying the IHEs and reserve pool whose supplies of teachers are relevant to an LEA, or set of LEAs.

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